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(19)

(54) TEA BAGS

(71) We, UNILEVER LIMITED, a British company, of Unilever House, Blackfriars, London EC4, England, do hereby declare the invention for which we pray that a patent may be granted to us and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to tea bags.

A substantial amount of tea is sold in tea bags. Tea bags usually contain leaf tea in amounts of about 2—3 grams per bag, black leaf tea being the most commonly used. Sometimes the leaf tea is blended with minor amounts of instant soluble tea.

The beverage qualities of both leaf tea and instant soluble tea are partly determined by the water with which they are infused during preparation of the beverage. Teas brewed in water with a high temporary hardness often have an undersirable grey-brown colour. In addition, teas from differing geographical sources and growing conditions have differing properties, and as a result some commercial tea blends inherently produce infusions of lower qualitv colour.

It is known that citric acid improves the colour of the tea liquor obtained on infusion. It has also been suggested to include a buffering agent, such as citric acid and ascorbic acid and their salts, mixed with leaf tea in tea bags to improve the colour of the resulting infusions. Because the amount of such buffering agents necessary is normally quite small, the dosing of such small quantities of ingredients in a tea bag poses considerable practical problems. Whereas in principle it is possible to dose the buffering agent, usually a powder, into the bag during the filling operation, this method is not an attractive proposition for use in practice because it needs highly accurate dosing systems and modification of the standard tea bag filling machines.

An alternative is to blend the acid or buffering agent into the leaf-stock before filling, but it is very difficult to achieve a homogeneous distribution of the powdered buffering agent in the leaf tea bulk, due to differences in density, shape and particle size. As a result, the tea bags will show a considerable variation in additive content, ranging fron nil to much too high a percentage.

The present invention provides a method of producing tea bags from which infusions having improved colour can be derived, without incurring the above drawbacks.

By the invention it has now been found that an improved colour of the tea liquor on infusion is obtained if the tea bag is made from water-pervious sheet material having edible acidic material incorporated therein, and the water used for infusing the tea bag liberates the acidic material from the water-pervious sheet material into the liquor, leading to the desired colour improvement. The acidic material is incorporated in the water-pervious sheet material prior to the making of the tea bag, and so the above-described dosing problems are mitigated and a much better control of the content of acidic material per bag can be achieved.

The invention provides a tea bag, formed from water-pervious sheet material having impregnated therein at a level of 0.03 to 0.5 mg/sq cm an acidic material, the tea bag incorporating from 2 to 25 mg of impregnated acidic material per gram of leaf tea and the acidic material being selected from the following: citric acid, malic acid, glutaric acid, tartaric acid, succinic acid, monosodium hydrosulphate, and buffering mixtures of any of these acidic materials with water-soluble salts of the same acidic materials. Preferably the amount of acidic material impregnated in the water-pervious sheet material is at least 0.05 mg/sq cm. Preferably the amount of

acidic material impregnated in the water-pervious sheet material is not greater than 0.3 mg/sq cm.

Preferably the tea bag contains at least 5 mg of impregnated acidic material per gram of tea. Preferably the tea bag contains not more than 20 mg of impregnated acidic material per gram of tea.

The acidic material can be a free acid. Instead of one acid, mixtures of two or more can be used. Without detracting from the inventive concept, a buffering mixture comprising an acid and its salt can be used as well, and the expression "acidic material" should be read as including such a combination. Preferably the acidic material impregnated in the tea bag paper always includes citric acid. The advantages of the invention can be achieved in a very straightforward manner simply by the use of citric acid as the sole acidic material. Examples of suitable buffers are combinations of an edible acid with a water-soluble salt of the same acid. Alkali-metal salts are preferred. Specific examples of suitable buffers are citric acid/trisodium citrate and malic acid/sodium malate.

As the colour of the tea infusion depends upon the temporary hardness of the water used to prepare the infusion, the more alkaline the water the greater is the quantity of acidic material needed to brighten up the colour to a sufficient degree, and less acidic material is necessary in softer water areas. The ranges stated above, however, are quite adequate to cover a wide range of water alkalinity, without detrimentally affecting the other beverage qualities of the tea.

The water-pervious sheet material can be any of the materials in current use, or proposed for use, in the manufacture of tea bags. The commonest material is paper, but woven fabrics and synthetic gauzes made from, for example, polypropylene, can be employed. The physical properties, such as porosity and strength when dry and wet, required in a sheet material from which tea bags are to be manufactured are well known in the art, and form no part of the present invention.

For convenience, the invention will be further described in relation to tea bags made from paper.

Various techniques for incorporating an agent in paper are known in the art, and any suitable technique can be employed. The acidic material can be impregnated in the paper by addition thereto during a wet stage of the otherwise conventional process by which commercial tea bag paper is made, i.e. by incorporation in the pulp prior to or during the making of the paper. A convenient apparatus, known for use in the manufacture of impregnated papers in general, is the size press. Alternatively, commercial tea bag paper can be dipped in or sprayed with an aqueous solution of acidic material and subsequently dried. Where the acidic material is impregnated into commercial tea bag paper, it is possible that shrinkage of the paper will result. Thus it is preferable that the acidic material be impregnated in the paper before the paper is cut to a dimension suitable for the manufacture of tea bags. Preferably the aqueous solution of the acidic material into which commercial tea bag paper is dipped contains from 1 to 10% by weight of the acidic material. When the impregnated paper is made by spraying an aqueous solution onto commercial tea bag paper, the aqueous solution preferably contains from 5 to 60% by weight of the acidic material.

The invention is illustrated by the following Examples.

Examples 1—6

The effect of certain acids on the colour of tea liquors obtained from tea bags was assessed as follows.

Commercial tea bag paper was impregnated with acid by dipping in an aqueous solution of the acid, and drying, the resulting acid load in the paper being approximately 0.28 mg/sq cm. The impregnated paper was used to prepare tea bags of the standard heat-sealed type, each bag being constructed from a total of 106 sq cm of paper and containing 2 grams of "MCTB" catering grade blended black leaf tea. Each bag therefore contained approximately 30 mg of the acid. Control bags made from non-impregnated paper were prepared also.

200 ml of water having a temporary hardness of 180 ppm was used to infuse one tea bag, and the properties of the resulting liquor assessed against the control. Colour scoring was in arbitrary units, i.e. highest score=best colour. The results are shown below.

Example	Acid	Colour Score	Flavour
Control	None	+	Good
1.	Citric acid	+++++	Good
2.	Malic acid	+++++	Good
3.	Glutaric acid	++	Good
4.	Tartaric acid	+++	Good
5.	Succinic acid	++++	Slight off-taste
6.	$NaHSO_4$	++	Good

Example 7

The effect of citric acid on the pH values of infusions obtained from various commercial tea blends was examined. Tea bags of the "Constanta" type were made from paper which had been impregnated, by dipping and drying, with citric acid at a level of approximately 0.23 mg/sq cm, each bag being constructed from 130 sq cm of paper and therefore containing a total of 30 mg acid. The bags each contained 2 grams of leaf tea of one of the following blends. Control bags were prepared using non-impregnated paper. Each bag was infused in 180 ml of boiling water, and the pH of the resulting liquor measured using a standard pH meter. The pH values measured were as follows:

Tea Blend	pH values: Control tea without acid	pH values: Citrated tea
"Yellow label" (Registered Trade Mark)	6.14	5.54
China	6.03	5.55
Ceylon	6.85	6.37
Darjeeling	6.78	6.37
"English Breakfast"	6.70	6.00

The above results show that an acid:tea ratio of 15 mg/gram produces a pH safely above 4.6, the pH value at which milk curdles.

Example 8

This Example shows tristimulus colour values of the liquors produced from various commercial tea blends with and without citric acid (30 mg/bag: standard heat-sealed type made as per Examples 1 to 6 above). The tea colours were measured under standard conditions with the Pretema Reflectance Spectrophotometer. Colours were expressed in terms of luminance (Y), dominant wavelength (LD) and purity of colour (P). Each tea bag, containing 2 grams of leaf tea, was infused with 200 ml boiling water.

The results were as follows:

Tea Blend	Sample	Y	LD	P
"Yellow label"	Control	11.28	581.8	0.466
(Registered Trade Mark)	Citrated	13.86	583.4	0.448
Ceylon	Control	11.30	580.3	0.440
	Citrated	11.54	581.5	0.437
Darjeeling	Control	11.69	579.6	0.421
	Citrated	12.16	580.1	0.393
"English Breakfast"	Control	11.64	580.2	0.425
	Citrated	12.22	582.2	0.439

The above results show that in all cases citric acid increases the luminance value (Y) of the tea and shifts the dominant wavelength (LD) by 1—2 nanometres towards the red end of the spectrum. Although in most instances the purity of colour (P) was inferior in the citrated infusions, as measured by the spectrophotometer, this parameter is swamped by the improvements in Y and LD and the human eye sees an overall improvement. In each instance the measured changes were accompanied by a marked increase in brightness and orangeness as perceived by the eye.

Example 9

This Example illustrates the large-scale preparation of tea bags from paper impregnated with citric acid.

2.600 m of Crompton 15 gsm commercial tea bag paper, width 282 mm, was unrolled and passed through a bath containing 20 l of 2.12% by weight aqueous citric acid, and dried by passage through a drying chamber containing heating zones at temperatures ranging from 38°C to 56°C. After rewinding, two 94 mm width reels were cut, and this paper used to produce "Constanta" tea bags. Each tea bag contained 2 gm commercial black leaf tea, and approximately 9.7 mg acid. On infusion in 180 ml of boiling water, sample bags yielded liquors of good appearance and flavour.

Examples 10 and 11

The procedure of Example 9 was repeated, but using instead stronger solutions of citric acid at the impregnation stage, namely 4.24% (Example 10) and 6.36% (Example 11). These gave rise to "Constanta" tea bags each containing approximately 18.8 mg and 29.9 mg of citric acid respectively. Aqueous infusions obtained from these bags were even better than those obtained from the tea bags of Example 9, this being consistent with the higher acid levels used.

WHAT WE CLAIM IS:—

1. A tea bag, formed from water-pervious sheet material having impregnated therein at a level of 0.03 to 0.5 mg/sq cm an acidic material, the tea bag incorporating from 2 to 25 mg of impregnated acidic material per gram of leaf tea and the acidic material being selected from the following: citric acid, malic acid, glutaric acid, tartaric acid, succinic acid, monosodium hydrosulphate, and buffering mixtures of any of these acidic materials with water-soluble salts of the same acidic materials.

2. A tea bag as claimed in claim 1, wherein the acidic material is impregnated in the water-pervious sheet material at a level of at least 0.05 mg/sq cm.

3. A tea bag as claimed in claim 1 or claim 2, wherein the acidic material is impregnated in the water-pervious sheet material at a level of not greater than 0.3 mg/sq cm.

4. A tea bag as claimed in any one of the preceding claims, wherein the tea bag incorporates at least 5 mg of impregnated acidic material per gram of leaf tea.

5. A tea bag as claimed in any one of the preceding claims, wherein the tea bag incorporates not more than 20 mg of impregnated acidic material per gram of leaf tea.

6. A tea bag as claimed in any one of the preceding claims, wherein the water-pervious sheet material is paper.

7. A tea bag as claimed in any one of the preceding claims, wherein the acidic material is citric acid.

8. A tea bag as claimed in any one of claims 1 to 6, wherein the acidic material is malic acid.

9. A tea bag according to claim 1 and substantially as hereinbefore described in any one of Examples 1 to 8.

10. A tea bag according to claim 1 and substantially as hereinbefore described in any one of Examples 9 to 11.

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